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# CANADIAN PATENT

## PROCESS FOR DYEING HAIR

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This invention relates to the dyeing of human hair, especially living hair on the head.

According to the invention there is provided a process of dyeing human hair which comprises treating the hair with peroxymono-  
sulphuric acid, peroxymonophosphoric acid, or an organic peroxy acid,  
or a salt or ester of these peroxy acids, and subsequently treating the  
hair with a solution of a reactive dye to colour the hair.

Examples of organic peroxy acids that may be used to pre-treat  
the hair prior to the application of the reactive dye are peracetic  
acid, diperbrassylic acid, and perbenzoic acid. The organic peroxy  
acids may be used in the form of their urea adducts.

Examples of salts of the peroxy acids which may be used are  
the alkali metal and ammonium salts. Especially suitable is the  
potassium triple salt  $2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$ .

Alkaline salts may be mixed with the peroxy compounds.  
Preferred salts are alkali metal carbonates and phosphates, such as  
potassium carbonate and sodium phosphate. Soaps may also be used.  
The pH of solutions or dispersions of the peroxy compound while not  
being critical is desirably not less than 3 or greater than 10.

The concentration of the peroxy compound in the solution  
or dispersion applied to the hair is not critical and the use of  
quite small amounts of the above peroxy compounds will enable a  
greater dyeing effect to be obtained when the hair is treated with  
the solution of the reactive dye. The optimum concentration will  
depend on the particular peroxy compound used but will usually be  
in the range 0.5 to 10%.

The peroxy compounds used in the process of this invention  
do not bleach hair.

By a "reactive dye" is meant herein a dye containing a reactive halogen atom or other reactive group, that is to say a halogen atom or other group capable of forming covalent bonds with the hair, or a dye which forms such a group in situ. Examples of classes of such reactive dyes are dyes containing a mono- or dichloro or bromo 1,3,5-triazinyl group, mono- or di-chloro or bromo-pyrimidyl group, beta-halogen-propionyl group, beta-halogenoethyl-sulphonyl group, beta-halogenoethylsulphamyl group, chloroacetyl amino, beta-(chloro-methyl)-beta-sulphatoethylsulphamyl group, or a vinyl sulphonyl group.

In the case of the dyes containing a triazinyl group or a pyrimidyl group, in place of the reactive halogen atoms one can use other groups which dissociate in the presence of alkali; examples of such other groups are the sulphonic acid, thiocyanate, sulphophenoxy, sulphophenyl thio, nitrosulphophenoxy groups, and quaternary ammonium groups.

The dyestuffs in these classes may be for example of the nitro-, azo, anthraquinone or phthalocyanine series and may contain free metal or metal in complex formation.

Mixtures of dyes may be used.

Examples of classes of reactive dyes that may be employed are those available commercially under the trades names:

Procion, Remazol, Drimarene, Remazolan and Levafix. Typical examples of these classes of dyes which may be employed are:

Procion Yellow M-RS	C.I. Reactive Yellow 4
Procion Brilliant Orange 2RS	C.I. Reactive Orange 4
Procion Brilliant Red 5BS	C.I. Reactive Red 2
Procion Brilliant Red 8BS	C.I. Reactive Red 11
Procion Blue 3GS	C.I. Reactive Blue 1
Remazol Yellow GR	C.I. Reactive Yellow 13

Remazol Brilliant Violet SR	C.I. Reactive Violet 5
Remazol Black B	C.I. Reactive Black 5
Drimarene Red Z-2B	C.I. Reactive Red 17
Drimarene Blue Z-GL	C.I. Reactive Blue 16
Drimarene Navy Blue Z-2RL	C.I. Reactive Blue 10
Levafix Red Violet E2BL	C.I. Reactive Violet 7

10      The concentration of the dye in the dye solution is not critical. For most purposes a concentration of at least 0.1% will be used and it will not usually be necessary to exceed a concentration of 10%.

It will usually be necessary to make the solution of the reactive dye alkaline. This is conveniently achieved by including alkali metal carbonates or other alkaline salts in the solution.

Solutions of the peroxy compound or the solutions of the reactive dye or both may contain additionally inert constituents such as thickeners, surface-active agents, or perfumes.

20      Before actual use the peroxy compound is preferably kept as a dry powder which is subsequently made up into the required solution; if desired the dye also may be kept as a powder. Other ingredients, if any, mixed with powders of the peroxy compound or the dye should also preferably be anhydrous. Apart from the above-mentioned additional ingredients, namely alkaline salts, surface-active agents and thickeners, one may also include in the powders, diluents such .....

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as potassium sulphate. The powders may be made up in tablet form.

The following Examples illustrate the invention. Percentages are on a weight for weight basis.

Example 1

5 A switch of blonde hair was treated with an aqueous solution consisting of potassium peroxymonosulphate triple salt (4%), potassium carbonate (0.2%), and mono-ethanolamine lauryl sulphate (20%) and containing as thickening agent Carbopol 934 (30% of a 2% gel). The time of the treatment was 1 to 15 minutes dependent on the  
10 depth of colour ultimately required. The hair was then rinsed, towel dried and dyed with an aqueous solution of Remazol Black B (2%) containing potassium carbonate (4%) and thickened by the addition of Carbopol 934 as before. The hair was dyed for a period of 10 to 30 minutes at 20 to 40°C. depending on the depth  
15 of colour required. The hair was dyed a dark blue colour.

Example 2

A switch of blonde hair was treated with an aqueous solution of potassium peroxymonosulphate triple salt (4%) for 5 minutes, rinsed and towel dried. The hair was dyed with an aqueous solution  
20 of Precision Brilliant Red 5BS (2%) containing potassium carbonate (4%) for 20 minutes. The hair was dyed a deep red colour.

Example 3

A switch of blonde hair was treated with an aqueous solution of peracetic acid (1%) for 10 minutes, rinsed and towel  
25 dried. The hair was then dyed with an aqueous solution of Remasolan Orange GG (2%) containing potassium carbonate (4%) for 20 minutes. The hair was dyed a bright orange colour.

Example 4

A switch of blonde hair was treated with an aqueous solution of  
30 potassium peroxymonosulphate triple salt (4%) containing potassium carbonate (0.1%) for 10 minutes, rinsed with water and towel dried. The

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hair was then dyed with an aqueous solution containing Remazol Black B (0.6%), Remazol Orange GO (0.4%), Procion Printing Green 5G (1.0%) and potassium carbonate (4%) for 20 minutes at room temperature. The hair was dyed a dark brown colour.

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Example 5

A switch of Italian blonde hair was treated with an aqueous solution of potassium peroxymonosulphate triple salt (4%) for 5 minutes, rinsed and dried. The hair was then dyed with an aqueous solution of Procion Brilliant Red 5BS (2%) containing potassium carbonate (4%) for 20 minutes. The switch was dyed a deep red colour. One half of this switch was then subjected to repeated treatments and dyeing as described. After four treatments and dyeings no difference in colour between the two halves of the switch was discernible. After further dyeings a slight build-up of colour became apparent.

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This experiment demonstrates the lack of colour build-up experienced with the process of the invention relative to conventional methods of dyeing hair.

By the processes described satisfactory uniform dyeing of the hair was obtained.

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A feature of this invention is that satisfactory dyeing of human hair can be obtained without any intermediate application of a reducing agent between the treatments of the hair with the peroxy compound and with the reactive dye.

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It is of interest that while, in accordance with this invention, pre-treatment of hair with peroxymonosulphuric acid and its salts considerably increases the uptake of reactive dye by the hair, the same effect is not obtained with peroxydisulphuric acid and its salts, used either alone or in combination with hydrogen peroxide.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A process of dyeing human hair which comprises treating the hair with peroxymonosulphuric acid, peroxyphosphoric acid, or an organic peroxy acid, or a salt or ester of these peroxy acids, and subsequently treating the hair with a solution of a reactive dye to colour the hair.
2. A process as claimed in claim 1, wherein the peroxy acid or salt or ester thereof is applied to the hair as a solution or dispersion containing 0.5 to 10% by weight of the peroxy compound.
3. A process as claimed in claim 1 or claim 2, wherein the solution of the reactive dye has a concentration of 0.1 to 10%.
4. A process as claimed in claim 1 or claim 2, wherein the peroxy compound used to treat the hair is the potassium triple salt  $2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$ .
5. A process as claimed in claim 1 or claim 2, wherein the peroxy acid or salt or ester thereof is applied to the hair as a solution or dispersion having a pH of from 3 to 10.

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